Bank Liquidity Pressures and the Availability of Bank Credit to Small Firms: Was the 2007-2009 Credit Crisis Different?

by

Joe Peek
Gatton College of Business and Economics University of Kentucky Lexington, KY 40506-0034

for

Under contract no. SBAHQ-09-M-0283

Release Date: September 2011

Contents

Executive Summary

This study focuses on the effects on credit availability of changes in both the availability of, and the need for, bank liquidity. It also examines the extent to which the recent liquidity crisis faced by many banks may have adversely affected the availability of credit to small firms. Bank liquidity concerns arise from both the asset side of the balance sheet, in the form of liquid assets held, and the liability side of the balance sheet, in the form of unused loan commitments that must be met on demand.

During the pre-crisis period, a higher liquid assets ratio was associated with a larger increase in total loans, commercial and industrial (C&I) loans, and commercial real estate (CRE) loans as a share of assets. This sensitivity increased during the 2007-2009 financial crisis and persisted immediately following the crisis in 2010. On the other side of bank balance sheets, unused loan commitments tended to stimulate lending, although this effect was weaker during the crisis for CRE commitments on CRE loans.

For the changes in the small loan shares, several interesting patterns emerge. While the general rebalancing effect is apparent for both small C&I and small CRE loans for their shares relative to both total assets and total loans, that rebalancing appears to be primarily at the expense of large, not small, loans: a higher portfolio share of C&I loans is associated with a larger change in small C&I loans as a share of total C&I loans, and a higher portfolio share of CRE loans is associated with a larger change in small CRE loans as a share of total CRE loans. With respect to bank health, healthier banks tend to shy away from small C&I loans and small CRE loans.

Liquidity impacts bank portfolio composition in terms of small business loans relative to total assets and total loans, as well as the mix of small versus large C&I and CRE loans. Banks

with more liquid assets tend to have a larger change in both small C&I loans and small CRE loans relative to total assets, yet tend to have a smaller change in the share of small C&I loans relative to total C&I loans and small CRE loans relative to total CRE loans. While the sensitivity to liquidity did not change during the crisis for small C&I loans, the immediate post-crisis period exhibited increased sensitivity of the share relative to both total assets and total loans. On the other hand, the share of small CRE loans relative to total assets showed increased sensitivity to liquid assets during the crisis but no lasting differential effect post-crisis.

Unused loan commitments do not appear to play a role in the relative composition of small versus large C&I and CRE loans, although they do impact the change in the share of small C&I loans relative to total assets and total loans. Thus, for example, to the extent that unused C&I loan commitments positively impact the change in small C&I loans relative to total assets and total loans, they do not appear to do so at the expense of large C&I loans.

Introduction

Much concern has been expressed about the impact of the recent turmoil in U.S. credit markets on the availability of credit to small firms. While an extensive literature exists investigating the role of bank capital/credit crunches on the availability of credit, especially to small firms, this study will extend that literature by focusing on the additional implications for, and effects on, bank lending to small businesses emanating from changes in bank liquidity, with a special emphasis on the liquidity crisis suffered by financial institutions (and nonfinancial firms) during the recent disruptions in credit markets. Even though total bank lending slowed sharply, a particular concern is that banks may have met lending obligations, such as from loan commitments, to larger firms at the expense of smaller firms, causing the supply of credit to smaller firms to plummet even more sharply.

The focus of this study is on the effects on credit availability of changes in both the availability of, and the need for, bank liquidity, as well as the extent to which the recent liquidity crisis faced by many banks magnified the usual adverse effect on credit availability to small firms. While the most recent recession is viewed as the most severe since the Great Depression, it also differs in character from previous U.S. postwar recessions. While the 1990-91 recession similarly had large numbers of bank failures and a sharp rise in the number of problem banks and the associated volume of problem bank assets (as compiled by the FDIC), previous postwar U.S. recessions have not been associated with such a widespread malfunction of capital and credit markets. Although the Federal Reserve and Treasury responded with a wide array of nontraditional credit market initiatives, including direct lending, credit guarantees, and asset purchases, to supplement a monetary policy stimulus that included quantitative easing, banks have responded to this surge in government provision of capital and liquidity by building up their

reserves rather than accelerating loan growth. Consequently, it is important to better understand the role of bank liquidity, and how the current crisis may have changed that role, in affecting the availability of bank credit.

Because the severe liquidity crisis is the defining characteristic of the recent credit market disruptions, this study highlights two specific effects emanating from the liquidity crisis. First, the liquidity crisis limited the ability of banks to fund their asset portfolios in short-term credit markets. This, in turn, forced asset sales that drove down the prices of financial assets, adversely impacting the capital of financial institutions, which, in turn, put pressure on banks to shrink the size of their asset portfolios. Second, loans to small firms may have been crowded out of bank balance sheets due to the effects of the liquidity crisis as (1) larger firms with loan commitments from banks drew down those commitments to a greater degree than normal, (2) banks were forced to retain assets that they had planned to securitize, and (3) banks were forced to take back onto their balance sheets assets that they had earlier moved to off-balance-sheet structures. To the extent that the liquidity crisis altered the pattern and magnitudes of the reduction in bank credit across different types and sizes of firms in this most recent banking crisis, it is important to have a better understanding of how banks with differing characteristics reacted differentially in terms of the reduced availability of credit to small firms in order to better design public policies intended to improve the functioning of credit markets.

While it has been argued that the waves of financial innovation and deregulation have reduced the importance of bank credit for many firms, the recent financial turmoil indicates that banks still play a significant role in financial markets, especially when liquidity dries up. Starting in July 2007 with the substantial downgrades of financial instruments tied to the subprime mortgage market, many financial intermediaries found that they were unable to obtain short-term

funding. Concern about the reliability of the credit ratings provided by rating agencies impeded the ability of financial intermediaries to securitize a wide variety of assets. Leveraged buyout loans, jumbo mortgage loans, and asset-backed commercial paper were all difficult to place in securitized products. As a consequence, many of these assets flowed back onto bank balance sheets, the interest rates for assets normally placed in asset-backed securities rose significantly, and banks became the primary source of continued financing.

Some differences in credit growth around the three most recent recessions are apparent in Figure 1, which contains aggregate bank loan growth rates for total loans, commercial and industrial (C&I) loans, and commercial real estate (CRE) loans. While in the previous two recessions loan growth declined prior to the start of the recession, the growth rates of all three loan aggregates were increasing heading into the most recent recession. Moreover, the surge in the growth rate of C&I loans is particularly striking, consistent with firms engaging in distress borrowing to fund inventory accumulation or building their liquid assets in anticipation of reduced credit availability in the future. However, the most recent recession is similar insofar as loan growth rates continued to decline for a period after the official end of the recession.

The much sharper and much larger decline in the C&I loan growth rate in this most recent recession suggests that this episode was different, likely related to the effects of the liquidity crisis and the more general malfunctioning of credit markets. Still, it is always difficult to separate loan supply effects from loan demand effects. When a decline in the quantity of bank loans occurs, it is typically due to some combination of a tightening of loan supply conditions and a weakening of loan demand. This episode is no different. As can be seen in Figures 2 and 3, loan standards were being tightened for both C&I loans and CRE loans going into the most

Figure 1: Four-Quarter Growth Rate of Aggregate Bank Loans, 1986 - 2011 (Quarterly)

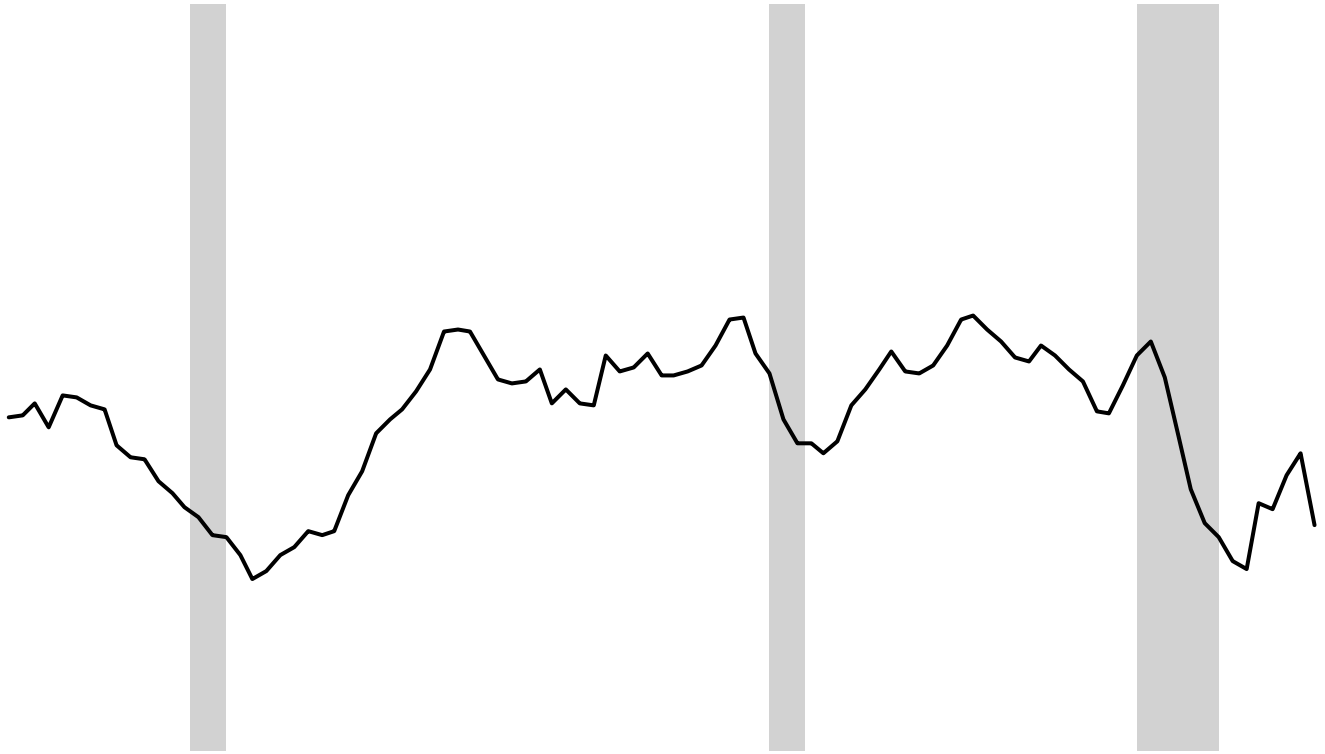


Figure 2: Measures of Supply and Demand for Commercial & Industrial Loans, by Size of Firm Seeking Loan

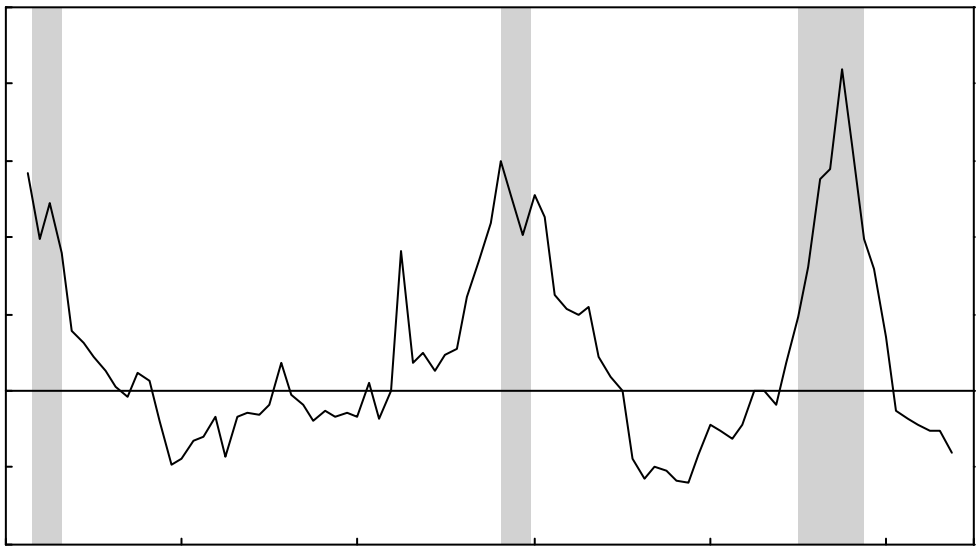
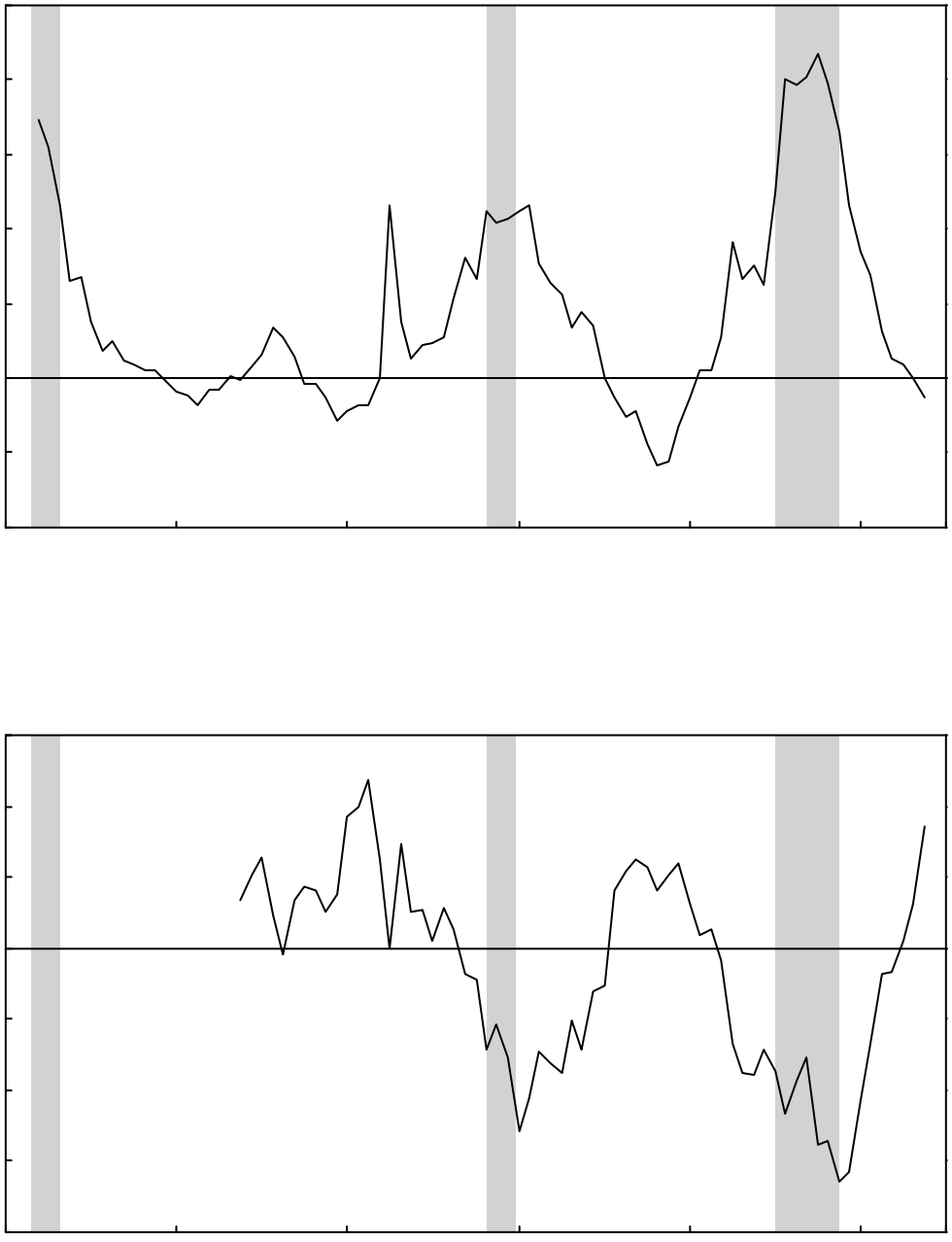


Figure 3: Measures of Supply and Demand for Commercial Real Estate Loans



recent recessions. However, at the same time, loan demand was weakening along with the economy.

Using data from the Loans to Small Businesses and Small Farms (Schedule RC-C, Part II) contained in the June Consolidated Reports of Condition and Income for individual banks (Call Reports) through June 2010, this study investigates the role of bank liquidity and the extent to which banks differed from their historical patterns in their provision of credit to small firms based on differences in bank characteristics associated with the supply of, and need for, bank liquidity. While one might expect banking organizations to have attempted to insulate themselves to be better able to weather "normal" credit cycles, this cycle deviated far from the normal experience, insofar as the external sources of liquidity upon which many banking organizations had planned on accessing dried up. Because the ability of banks to supply liquidity on demand to their customers depends on the bank's own liquidity, the severity of the crisis disrupted the provision of bank credit.

This study provides evidence that bank lending behavior is sensitive to bank health and liquid assets, as well as to exposure to unused loan commitments, and that the financial crisis altered some of these sensitivities. In terms of small business lending, the study finds that changes in the shares of small business loans relative to total assets and total loans, as well as the mix of small versus large C&I and CRE loans, do respond to bank characteristics, and in some instances, these sensitivities were altered by the financial crisis. For example, while more liquid banks tend to increase small C&I loans relative to total assets, and this sensitivity became even more pronounced immediately after the crisis, this portfolio shift appears to favor large rather than small C&I loans, insofar as more liquid banks tend to have smaller changes in the share of small C&I loans relative to total C&I loans. A similar pattern is observed for small CRE loans,

with more liquid banks tending to increase small CRE loans relative to total assets, decreasing the share relative to total CRE loans.

Background

The previous literature has established that most small firms are "bank dependent" for their external finance. Furthermore, it has been shown that bank lending is adversely impacted by a tightening of monetary policy, by regulatory changes that tighten capital requirements, and by bank capital crunches. More recently, the current crisis has highlighted the importance of liquidity as an important determinant of the ability of banks to satisfy loan demand. While a liquidity crisis is distinct from a tightening of monetary policy, they do share some characteristics in terms of the stress placed on banks in raising short-term funds and meeting loan demand. Moreover, the lending (credit) view of the transmission of monetary policy emphasizes the role of bank lending in reinforcing, or magnifying, any direct effects emanating from changes in interest rates in determining the magnitude with which changes in monetary policy affect real economic activity. Thus, the literature on the effects of a monetary policy tightening on bank credit availability is of particular relevance.

Relationship lending

Much of the literature on relationship lending has focused on asymmetric information problems associated with smaller firms. Udell (1997) describes small firms as "informationally opaque" compared to large firms, which are "informationally transparent." Small firms usually have little or no collateral and, often being relatively young firms, lack an extensive history from which future firm or management performance can be extrapolated, even though the firm may have high growth potential. Because of their small size and the lack of substantial information on their

quality, such firms have virtually no access to external funds from national markets, such as through the issuance of commercial paper, bonds, or publicly traded equity. Similarly, while finance companies provide asset-backed financing, for example for loans collateralized by inventories and accounts receivable, for a small, opaque firm with few tangible assets, bank loans may be the only source of an unsecured line of credit or of a loan secured by an asset that might not be easily commoditized. As a result, many firms can be deemed to be bank dependent, having few alternatives to banks should their bank credit be curtailed. Moreover, it may be difficult to establish a new banking relationship should a firm's current primary lender be unable or unwilling to continue providing credit to a bank dependent borrower.

For a variety of institutional reasons, alternative sources of credit that are available to some firms, such as loans from nonbank financial intermediaries, open market instruments for short-term credit, and trade credit, are not perfect substitutes for bank credit. In particular, smaller firms are not able to issue open-market debt because the issue size would be too small to overcome the fixed costs of issuance at a reasonable interest rate. Similarly, firms that are sufficiently opaque or have a sufficiently low credit standing to require close monitoring by a financial intermediary would not have direct access to the credit markets. Still, even though large, highly rated firms can directly access public credit markets by issuing commercial paper, issuing unsecured commercial paper still may involve participation by banks, insofar as the issuing firms obtain third-party guarantees from the banks in order to enhance the credit rating of the commercial paper in order to lower the interest cost to the firm. Thus, even though many larger firms have come to rely less on direct credit from banks, they still compete indirectly with small firms for bank resources, and this competition comes to the front when credit markets come under stress, as has recently been the case.

To the extent that bank dependent borrowers are crowded out by other demands on their bank's resources, or even by an overall decline in credit availability due to a deterioration in the bank's own health, replacing that credit from another bank may be extremely difficult. It takes time to establish a new relationship with a bank that may be unfamiliar with the firm's business prospects. Moreover, if the curtailment of bank credit occurs during a general contraction of bank credit, finding an alternative source of credit to replace a lost bank relationship lender may be almost impossible. For example, during the most recent banking crisis, Jeon, Montoriol-Garriga, Triest and Wang (2010) find that community banks were unable or unwilling to fill the credit gap emanating from the decline in loan supply by large banks. Based on a May 2010 survey of community banks in the First Federal Reserve District, they conclude "that businesses that were turned away from large banks would generally have found it difficult to get credit at community banks."

Bank health and bank regulation

One of the most important bank characteristics that has been shown to affect the provision of bank credit is whether a bank faces a binding capital constraint. As a result of the "headwinds in monetary policy" noted by Chairman Greenspan during the recovery from the 1990 recession, a variety of authors have examined the impact that significant bank health problems can have on the transmission of monetary policy. For example, Peek and Rosengren (1995a) examined the impact that being capital constrained had on a bank's ability to lend during the period of significant banking problems in the early 1990s in New England. Using a simple static model, they show that banks facing a binding capital constraint are limited in altering the size of their balance sheet, restricting the ability of capital-constrained banks to respond to monetary policy shocks. They document that experiencing an adverse capital shock that makes the capital

constraint binding will cause banks to shrink both assets and liabilities. Peek and Rosengren (1995a) also show that the behavior of capital-constrained banks in New England differed from that of unconstrained banks, with the loan portfolios of unconstrained banks responding more to monetary policy shocks than those of the capital-constrained banks.

Peek and Rosengren (1995b) focus on the role of the enforcement of capital regulations through which bank supervisors can impact directly the ability of capital-constrained banks to lend, and thus to be able to increase loans in response to an easing of monetary policy. They examine the impact on bank lending of formal regulatory actions imposed on banks that experienced asset quality problems. They find that the enforcement actions by bank regulators included explicit capital targets that needed to be achieved over a short time frame. The result was an immediate and significant reduction in bank loan portfolios associated with the imposition of the enforcement action that persisted for some time thereafter while the bank continued to operate under the enforcement action.

A number of authors have examined whether changes in capital regulations, by causing banks to become capital constrained, cause banks to be particularly responsive to their capital constraint, and, by implication, less responsive to changes in monetary policy. For example, Hall (1993) finds that the introduction of the Basel I Accord had a significant impact on bank portfolios. Hancock and Wilcox (1994) also found that the implementation of the Basel I Accord affected banks' willingness to lend. However, Berger and Udell (1994) do not find evidence that the Basel I Accord created a bank capital crunch. More recently, a concern raised with the Basel II Accord has been that capital regulations would magnify potential capital constraints during recessions (for example, Kashyap and Stein 2004), making banks less responsive to an easing of monetary policy. Thus, a very real concern with the effectiveness of the bank lending channel,

and thus the overall effectiveness of monetary policy, is whether banks are capital constrained at the time of an easing of monetary policy. For example, given the liquidity crisis and bank capital problems, the recent easing of monetary policy may have little impact on increasing the availability of bank credit to firms.

Liquidity

Liquidity has multiple dimensions in the context of banks, being relevant on both the liability side and the asset side of bank balance sheets. On the liability side, funding liquidity is the primary concern. When monetary policy tightens, shrinking the volume of reserves available to the banking system, in the absence of excess reserves banks must shrink reservable deposits. As a consequence, banks must then either shrink assets or replace the lost reservable deposits with nonreservable liabilities. Similarly, if the availability of short-term funding to the banking system becomes impaired, as was the case during the recent banking crisis, banks must replace that funding with alternative sources or be forced to shrink assets. The severity of the crisis for a bank will depend, in part, on the composition of its liabilities. A bank that relies more heavily on wholesale funding will be impacted more than a bank that is able to rely primarily on stable core deposits when it becomes difficult to roll over short-term funding. Moreover, at the individual bank level, a bank may be somewhat more insulated from idiosyncratic shocks if it is a member of a holding company so that it can benefit from the internal capital market operating among the parent and its affiliate bank subsidiaries. Similarly, to the extent that a bank or its holding company is publicly traded, it typically will have better access to external funds, mitigating the effects of temporary liquidity shocks.

Funding liquidity on the liability side of a bank's balance sheet can interact with asset liquidity. One of the easiest ways to satisfy a need to shrink assets in response to a funding

liquidity shock is to sell securities, typically a relatively liquid asset. In fact, bank securities holdings are often referred to as "secondary reserves." Thus, a bank's ability to handle an adverse funding liquidity shock will depend, in part, on its holdings of securities, as well as its reliance on wholesale funding relative to core deposits. Banks with a heavy reliance on wholesale funding and/or a larger share of illiquid assets would be expected to curtail lending activity by more than banks that rely on a larger share of stable core deposits and maintain a relatively larger share of their assets in the form of liquid securities, although securities thought to be very liquid, such as asset-backed securities, may become relatively illiquid during a severe liquidity crunch such as was just experienced.

A market liquidity crunch, when secondary markets in assets freeze up, can be particularly damaging to a bank's health. When liquidity suddenly evaporates, banks may be forced to sell assets at "fire sale" prices, leading to capital losses that may impair the bank's capital cushion, as in the standard story of a bank run. Naturally, funding liquidity and market liquidity are interconnected and mutually reinforcing. The inability to roll over short-term funding or the inability to sell assets without suffering a "haircut" can, and will, form a feedback loop, each aggravating the other. Unfortunately, the development of financial markets and new products, by increasing reliance on short-term market funding and securitization, has increased the likelihood of experiencing a systemic liquidity crisis.

Liquidity pressures also can arise from a bank's exposure to unused loan commitments and precommitted lines of credit. To the extent that firms are more likely to take down unused commitments during periods of reduced credit availability and/or liquidity crunches, banks are squeezed from both sides of their balance sheets: loan demand surges at the same time that banks

are having trouble rolling over their short-term funding and selling assets without taking a substantial haircut.

Kashyap, Rajan and Stein (2002) have argued that banks, as providers of liquidity on demand, benefit from the synergies between deposit taking and lending. Insofar as declines in deposits and takedowns of unused loan commitments are imperfectly correlated, banks can economize on their holdings of liquid assets that serve as a buffer against such shocks. While this may be the case in general, Mora (2010) argues that when the liquidity crisis is bank centered, as was the case in the recent crisis, it may be more difficult for banks to attract the deposits to satisfy the increase in the demand for liquidity arising from those whose access to financial markets has been limited. In fact, Mora (2010) finds that those banks most exposed to increased demands for liquidity did not experience larger deposit inflows and had to either rely on alternative sources of liabilities or selling assets in their attempt to fund loan commitments. Moreover, Kacperczyk and Schnabl (2009) argue that the commercial paper market played a key role during the financial crisis on both sides of banks' balance sheets. As the volume of commercial paper plummeted, banks with their own difficulties rolling over their short-term financing were faced with increased loan demand from the issuers of commercial paper, especially asset-backed commercial paper, for which the banks had provided guarantees.

Ivashina and Scharfstein (2009) show that after the failure of Lehman Brothers, banks had increased difficulty rolling over their short-term funding and at the same time faced a run by borrowers to take down their lines of credit and unused loan commitments, resulting in a surge of C&I loans (see Figure 1). This caused banks to reduce their noncommitment lending, although the declines were less severe if they had better access to deposits as a source of liabilities. Cornett, McNutt, Strahan, and Tehranian (2010) find similar evidence of the effects of runs on

banks in the wholesale funding market and the run on unused commitments by borrowers pressuring the asset side of bank balance sheets. Increased exposure to liquidity risk, on both the liability side and the asset side of bank balance sheets, was associated with banks increasing their liquid assets buffer and reducing loan growth.

Building on much earlier work by Morgan (1998), Park (2007) similarly finds that the takedown of loan commitments increases during periods of restrained credit supply and that such takedowns crowd out bank loans not made under commitment, suggesting that the composition of bank loans between those borrowers typically relying on loan commitments and those not relying on commitments and lines of credit will be affected. At the same time, Huang (2009) finds an additional compositional effect among those borrowers with unused loan commitments or existing lines of credit at banks. The value of the liquidity insurance provided by such commitments depends on both the bank's health and the characteristics of the firms with the commitments. Huang (2009) finds that the actual supply of credit associated with the commitments is affected by the bank's own financial health on the one hand, and by the bank's ability to exploit financial covenants and borrowing-base requirements tied to the commitments. In particular, the more distressed is the bank's own financial situation, the smaller are the takedown volumes from the bank's commitments, with the cutbacks focused on borrowers that were smaller, had shorter relationships with the lender, and were deemed to expose the bank to more risk. In addition, while Campello, Giambona, Graham and Harvey (2010) find that those firms that are more credit constrained tend to rely more on commitments and draw down more credit from those commitments, they also are less likely to have their commitments renewed, or to be able to establish new commitments, during a liquidity crisis.

While evidence from the recent liquidity and banking crisis has provided some specific information about bank behavior, a much larger strand of literature related to the effects of monetary policy on bank behavior also provides evidence that is particularly relevant for understanding bank responses to liquidity pressures, with studies using panel data for individual banks or bank holding companies providing results that can be used to establish the determinants of bank loan supply. The key is relating cross-sectional differences in bank or banking organization characteristics to differences in the extent to which banks are able to insulate their loan portfolios from a tightening of monetary policy, a specific type of liquidity shock. Two aspects of bank characteristics appear to have been the primary focus. First, the ability of banks to raise nonreservable liabilities to replace the lost reservable deposits is a key factor in determining the extent to which a bank must adjust its loan portfolio when a tightening of monetary policy occurs. Because these funds are, for the most part, uninsured liabilities, bank characteristics related to their access to external funds, for example, size, health, and having direct access to capital markets, play an important role in determining the ability of banks to insulate their loan portfolios from the effects of changes in monetary policy. Second, because banks face a capital requirement constraint in addition to the reserve requirement constraint on their activities, banks may differ in their response to a change in the stance of monetary policy depending on which constraint is most binding. If the capital ratio requirement is the binding constraint, easing the reserve requirement constraint through open market operations should have little, if any, effect on bank lending. That is, because the binding constraint has not been eased, expansionary monetary policy, at least operating through the bank lending channel, would be like “pushing on a string.”

Kashyap and Stein (1995) note that with a tightening of monetary policy, and the associated loss in reservable deposits, it is costly for banks to raise uninsured deposits. However, banks differ in the degree to which they have access to external funds. They hypothesize that bank size is a reasonable proxy for their degree of access to uninsured liabilities, with smaller banks having more limited access, and thus having their loan portfolio impacted more by a tightening of monetary policy. Indeed, they find empirical support for the proposition that small banks are more responsive (shrink their loan portfolios by more) to a monetary policy tightening than are large banks.

Subsequently, Kashyap and Stein (2000) extend their analysis of the relative ease with which banks can raise uninsured deposits following a monetary policy tightening, noting that the bank loan response also will differ depending on the liquidity position of the bank. A bank that finds it relatively costly to raise uninsured deposits but that has large securities holdings has the option of adjusting to the shrinkage of reservable deposits by selling some of its securities, while a less liquid bank may be forced to shrink its loan portfolio by a greater degree. In a large cross-section of banks, they find evidence that the loan portfolios of smaller, more illiquid banks are the most responsive to monetary policy shocks.

This distinction is particularly important, although it can be misleading insofar as the better is a bank's access to liquidity, the less liquidity a bank must hold on its own balance sheet. Thus, one must distinguish among banks with respect to the degree to which they have access to external funds. Two dimensions of access to external funds by banks are particularly relevant. First, banks that are members of multibank holding companies have access to funds that are external to the bank but internal to the holding company through the operation of internal capital markets within the holding company. Second, stand-alone banks and bank (or financial services)

holding companies can differ in their access to external funds based on whether they are publicly traded. While smaller, non-publicly traded banking organizations rely primarily on raising deposits, larger, publicly traded banking organizations are able to raise funds through their direct access to capital markets as well as through raising deposits.

Broadening the Kashyap and Stein (2000) distinction, Campello (2002) goes further by classifying smaller banks based on whether the bank is affiliated with a large multibank holding company, finding that the lending of small banks that are affiliated with large multibank holding companies reacts less to a tightening of monetary policy than does the lending of similar small (stand-alone) banks that are not affiliated with multibank holding companies. Although this evidence indicates that small banks affiliated with multibank holding companies are better able to insulate their lending from a tightening of monetary policy, it is not clear the extent to which this is due to the channeling of internal holding company funds to bank subsidiaries rather than being due to large multibank holding companies having easier access to external funds. Campello tries to address this issue by using capital-to-asset ratios to distinguish among bank holding companies. Similarly, Kishan and Opiela (2000) use a bank's capital-to-asset ratio as the proxy for the ability of a bank to raise uninsured deposits, finding that the loan portfolios of well-capitalized banks are less sensitive to monetary policy shocks than those of poorly capitalized banks of the same size.

Holod and Peek (2007) utilize the distinction between publicly traded and non-publicly traded banks to classify banks by the ease with which they can access external funds. They find that after controlling for size, capitalization and other factors, the loan portfolios of publicly traded banks shrink less than those of non-publicly traded banks when monetary policy tightens due to the banks' ability to raise external funds, including issuing large time deposits.

Furthermore, as one would expect, when a distinction is made between tightening and easing monetary policy, the estimated effect can be attributed to the effects of monetary policy tightening (tightening a binding constraint) rather than monetary policy easing (possibly "pushing on a string").

The problems banks face during a liquidity crisis are similar to those faced when monetary policy is tightened. To maintain their asset portfolios, banks must be able to replenish lost liabilities, whether from the decline in reservable deposits as banking sector reserves decline due to a tightening of monetary policy or from declines in short-term market funding due to the freezing up of interbank or open-market sources of funding. Moreover, this pressure on bank liquidity is reinforced by the surge in loan demand, in large part through loan commitment takedowns, as nonfinancial firms face, or anticipate, a liquidity crunch of their own.

A key concern for this study is how banks typically react to changes in their own liquidity buffers and to their exposure to provide liquidity on demand to their customers, and, in particular, how the bank responses might differ from their normal responses during a liquidity crisis such as the one just experienced. Panel data techniques can be used to better understand the importance of cross-sectional differences among banks and how those differences may impact the availability of credit. A bank's reliance on core deposits rather than wholesale funding, the size of its liquid assets buffer, its capital ratio, and the degree of problems in its existing loan portfolio each would be expected to influence the bank's willingness and ability to provide credit. In addition, its exposure to a surge in loan demand related to its unused loan commitments and existing lines of credit, as well as the extent to which it may have easier access to funds external to the bank through being affiliated with a holding company and/or being publicly traded, will have particular importance during a liquidity crisis.

Moreover, one might expect to find that differences across banks will have implications for the relative supply of credit to small businesses. For example, to the extent that smaller firms rely less on loan commitments and lines of credit, loans to small firms may be crowded out during a credit crunch. Similarly, if smaller firms are deemed to be more risky, small businesses may suffer larger declines in bank loan supply when banks attempt to mitigate their risk exposure. In fact, Black and Rosen (2008) find that a tightening of monetary policy is associated with a shift of bank loans from smaller to larger firms. Thus, small business lending is at risk of being crowded out by loans to larger firms, as well as by banks reducing overall lending or shifting their portfolio holdings to other types of assets.

Data

The primary data for this study come from two major sources: the Federal Reserve's Consolidated Reports of Condition and Income (Call Reports) and the Federal Reserve's National Information Center database (NIC). The initial bank sample consists of the set of FDIC-insured commercial banks headquartered in one of the 48 contiguous states. Because savings and loans file a different Call Report, and because both savings and loans and savings banks focus primarily on real estate loans rather than business loans, these two types of institutions have been omitted from the analysis. Foreign-owned banks, credit card banks, including those identified in the Call Reports as credit card banks as well as any remaining banks with a value of credit card loans to total loans exceeding 50 percent, and banks that are not active in the loan market, defined as banks with a maximum loans-to-assets ratio less than 5 percent, are eliminated from the bank sample. In addition, both *de novo* bank observations (the first two years of a bank's life)

and merger observations (when a bank merges with another bank at any time during the prior year) are omitted.

Balance sheet and income data for each bank are obtained from the bank Call Reports. Small business lending data are obtained from the annual Loans to Small Businesses and Small Farms section of the June bank Call Reports (Schedule RC-C Part II). Because the focus of the study is on small business lending, the sample is limited to annual observations for the second quarter of the year, since the Loans to Small Businesses and Small Farms schedule contained in the Call Reports is conducted only once per year in the June report. The sample begins with the June 1996 data to provide 10 years of observations prior to the recent crisis to serve as a benchmark. The sample ends with the most recent available data from the June 2010 Call Report that will include observations from the recent liquidity crisis. Because the first observation is lost due to using the change in loans, the regression sample consists of annual observations from 1997 through 2010.

The Loans to Small Businesses and Farms schedule provides information on loan sizes of $1 million or less in four different loan categories: domestic commercial and industrial loans (C&I), real estate loans secured by nonfarm nonresidential properties (commercial real estate, denoted as CRE), real estate loans secured by farmland, and loans to finance agricultural production. The schedule also disaggregates these loans into three size categories: less than or equal to $100,000, between $100,000 and $250,000, and between $250,000 and $1 million (between $250,000 and $500,000 for agricultural and farm loans). This study will focus only on C&I and CRE loans of $1 million or less to capture the effect of the liquidity crisis on small business lending. In addition, for comparative purposes, the analysis also will be done for the smallest loan category, loans less than or equal to $100,000.

Modeling Approach

During a liquidity crisis, when it is difficult for individual banks and banking organizations (bank holding companies or financial services holding companies) to raise external funds, and, at the same time, banks are being called upon to provide even more funding to their customers, for example through take downs from unused loan commitments, many banks find it difficult to provide liquidity on demand to their customers. Moreover, a liquidity crisis may adversely impact the values of many financial assets held on bank balance sheets, as well as making it difficult to sell such assets, as markets for specific categories of assets dry up. The declines in asset values associated with bank exposures then reduce bank capital, pressuring banks to either shrink assets, raise additional capital, or both, to maintain capital ratios above regulatory, or self-imposed, minimums. At the same time, a liquidity crisis will cause many firms to take down their unused loan commitments from banks and impair the ability of banks to securitize and otherwise move assets off of their balance sheets. In fact, banks may be forced to take back onto their balance sheets assets that had previously been placed in off-balance-sheet structures. Thus, banks may face severe pressures on their asset holdings from multiple sources.

Given their capital constraints and deteriorating ability to raise external funds, banks have to make choices about how to trade off the various demands for their limited resources. Among the choices banks face is the extent to which they are willing and able to meet the loan demand from their customers. While banks must meet the loan demand arising from take downs of unused loan commitments sold by the banks, they have much more discretion about approving other loan applications. Similarly, the extent to which banks are able to meet loan demand from customers depends upon the degree to which the banks either hold or have access to liquidity

themselves, as well as the extent to which they have to move other assets back onto their balance sheets.

The approach in this study will be to first investigate the determinants of aggregate lending. The second step will be to investigate more closely the determinants of changes in the small loan shares of total bank assets, total bank loans, and total loans of the given category. This step will shed light on the nature of any tradeoffs made by the banks. That is, were small business loans crowded out by other types of assets in a bank's portfolio, by other types of loans, or by large loans of the same type? Moreover, a particular focus of the study is to investigate the extent to which these relationships changed during the liquidity crisis.

The unit of observation for the regression analysis will be individual commercial banks. The dependent variables will be measures of the change in loans and the change in small business loan shares, focusing on the C&I and CRE loan categories reported in the Loans to Small Businesses and Small Farms. The basic regression equation to be estimated on panel data for the individual banks (k) is (omitting the k subscripts):

$$CLOANS_t = Constant + \sum a_i A_{i,t-1} + \sum b_i H_{i,t-1} + \sum c_i L_{i,t-1} + \varepsilon, \quad (1)$$

where CLOANS is either the change in the volume of loans scaled by bank assets or the change in the small business loan share, the A_i's represent various bank portfolio characteristics, the H_i's represent measures of bank health, and the L_i's are measures of bank liquidity, both the bank's access to liquidity and the demands on the bank's liquidity. The equation also includes the state employment growth rate for the state in which the bank is headquartered (Gempl) to control for local economic activity; a set of annual dummy variables to control for macroeconomic activity and regulatory changes, such as the recent introduction of the payment of interest on bank reserves by the Federal Reserve; and bank fixed effects to control for

differences in access to liquidity due to a bank being in a multibank holding company or being publicly traded, as well as other unobservable bank characteristics. In addition, cluster-robust standard errors are calculated that allow for within-cluster error correlation at the bank level.

The set of alternative dependent variables includes the change in total loans (Cla), the change in C&I loans (Ccia) and the change in CRE loans (Ccrea), each scaled by total assets, to serve as a benchmark that can be related to prior studies. Next, to investigate how small business lending was affected, the change in the small C&I loan share, measured relative to assets (Csmcia), total loans (Csmcil), or total C&I loans (Csmcici), and the change in the small CRE loan share, measured relative to assets (Csmcrea), total loans (Csmcreal), or total CRE loans (Csmcrecre) are used as the dependent variables. The use of the three alternative denominators allows a comparison of the extent to which small business loans might have been crowded out by other assets on a bank's balance sheet. Finally, the analysis of the changes in small C&I and small CRE loans will be repeated for the subcategory of small loans that are less than or equal to $100,000.

The vector A of the bank's characteristics includes measures of bank size and asset composition. The log of the bank's real assets, Lasset, uses the GDP price deflator to convert assets from nominal to constant dollar values. Shci, Shre, and Shcre are the shares of C&I loans, real estate loans, and CRE loans, respectively, in each instance being measured as a share of the bank's total assets. Note that the estimated coefficient on Shcre will represent a differential effect. That is, the estimated coefficient will reflect the additional effect emanating from CRE loans beyond the effect coming from real estate loans more generally.

The vector H of bank health indicators includes the bank's tier 1 leverage capital ratio, Kalev, the nonperforming loans ratio, Npltl, and the return on assets, ROA. The leverage ratio is

the regulatory leverage capital ratio, measured as tier 1 capital divided by average assets. The nonperforming loans ratio is calculated as the sum of loans past due 90 days or more and still accruing and nonaccrual loans, scaled by total loans. The return on assets is calculated as net income scaled by beginning-of-period total assets.

The vector L of bank liquidity indicators includes measures from both the asset and liability sides of the bank's balance sheet. Core deposits, Core, are measured as the sum of total transactions accounts, money market deposit accounts, other savings deposits and total time deposits of less than $100,000, scaled by total assets. Bank liquidity, Liquid1, is measured as the sum of federal funds sold, securities purchased under agreements to resell, and securities, less both federal funds purchased and securities sold under agreements to repurchase, then scaled by total assets. In light of the recent illiquidity of certain types of securities, a second liquidity measure, Liquid2, also is included to allow for those less liquid securities included in Liquid1 to have an effect that differs from the overall liquidity effect; that is, the estimated effect of Liquid2 will be a differential effect relative to the effect of the broader Liquid1 measure. Liquid2 includes the securities included in Liquid1 except for those issued by the U.S. Treasury, U.S. government agencies, or state and local governments, or issued or guaranteed by GNMA, FNMA or FHLMC, or collateralized by such securities.

Total unused loan commitments, Commitl, are measured as the sum of unused commitments for revolving, open-end lines secured by 1-4 family residential properties, credit card lines, commercial real estate, construction and land development, securities underwriting, and other unused commitments, financial standby letters of credit, performance standby letters of credit, and commercial and similar letters of credit, scaled by total loans. Unused CRE loan commitments, Commitcre, are measured as commercial real estate, construction, and land

development unused loan commitments, scaled by total loans. Unused C&I loan commitments are measured as the sum of "other" unused loan commitments, financial standby letters of credit, performance standby letters of credit, and commercial and similar letters of credit, scaled by total loans. Note that because Commitcre and Commitci are components of Commitl, their estimated effects represent any additional effects emanating from those types of unused commitments beyond the average effects from total unused loan commitments.

The specifications also will include interaction terms to allow for estimated coefficients on some of the explanatory variables to have different impacts during the 2007-2009 crisis period (D789) due to the extreme nature of the shocks experienced by the banking system. The same variables also are interacted with a 2010 dummy variable (D10) to investigate the extent to which any differences in effects persisted after the crisis subperiod.

Because the dependent variables are calculated as annual changes in loans or loan shares, bank mergers present a problem. Thus, to avoid discrete jumps in the values of the dependent variables associated with bank mergers, the observations in which a merger occurs during the prior year are removed from the sample to ensure that the calculation of the change in loans is done for comparable institutions. That is, if Bank B merges into Bank A between June 2005 and June 2006, the June 2006 observation for the change in loans for Bank A is removed, since the change in loans would be between Bank A in June 2005 and (Bank A + Bank B) in June 2006. Because the lagged ROA measure includes bank assets for period (t-2), the prior observation also must be omitted. Thus, in the example above, the June 2005 observation must be omitted as well. Observations with extreme values (outliers), defined as those observations with values for one of the dependent variables or explanatory variables (with the exception of Lasset) that deviate by

more than four standard deviations from the variable's mean value also are removed. After applying these filters, the dataset includes a total of 85,241 annual observations.

For easy reference, Table 1a contains a list of the variables used in the regressions with their data source and a brief description of each variable. Table 1b contains the summary statistics for each of the dependent and explanatory variables. To better scale the estimated coefficients, the loan shares used as the dependent variables and to calculate the changes in loan shares used as dependent variables have been calculated as a percent rather than a share by multiplying by 100. The dependent variables based on the first (smallest) category of small loans, those less than or equal to $100,000, are identified by adding the number one in the name; for example, Csm1cia compared with Csmcia. Note that the number of observations for Csmcici and Csmcrecre, as well as Csm1cici and Csm1crecre, are substantially smaller. This is because these measures are used to investigate the tradeoff between small and large loans within a given loan category. As such, it makes sense to include only those banks that do not typically hold 100% small or 100% large loans, given that such banks would rarely, if ever, be making such a tradeoff. Thus, no matter how the explanatory variables changed, the value of the dependent variable, the change in the small C&I or CRE loan ratio, would be stuck at zero. Thus, for these dependent variables, the regression sample includes only those banks that never have a small loan ratio of either zero or 100 percent.

Empirical Results

Table 2 contains the results for the change in total loans, the change in C&I loans, and the change in CRE loans, each scaled by assets. For total loans, shown in Column 1, the pattern of the estimated coefficients for the base explanatory variables is not surprising. Larger banks tend

to have a smaller growth rate of loans when scaled by assets, perhaps because the larger a bank becomes, the harder it is to maintain high growth rates. Higher shares of C&I loans, real estate loans and CRE loans, each measured relative to total assets, are associated with faster growth in total loans, in part because those banks that tend to hold a larger share of their assets in the form of loans likely focus more of their activity on lending, and thus are more likely to grow their loan portfolio relative to their total assets. A higher capital ratio, a smaller share of nonperforming loans, a higher ROA, and a higher liquid assets ratio are each associated with more rapid loan growth, while the differential effect of secondary liquid assets (Liquid2) has a smaller effect than that of primary liquid assets (Liquid1). And, unsurprisingly, more unused loan commitments are associated with higher subsequent loan growth. Finally, a faster growth rate of employment in the state in which a bank is headquartered is associated with higher loan growth, even though banking deregulation allowing interstate branching has weakened the link between the location of a bank's headquarters and where it does most of its business.

Each explanatory variable, other than the three loan share variables, also is interacted with a crisis dummy variable (D789) to investigate the extent to which banks' reactions differed during the crisis, and a post-crisis dummy variable (D10) to investigate the extent to which any differences persisted after the crisis. While the effect of bank size did not differ during the crisis, the negative effect of bank size was even larger after the crisis, suggesting that larger banks have been slower to begin ramping up their lending. Similarly, the positive effects of the bank capital ratio and ROA were even stronger during the post-crisis period, suggesting that banks placed even more emphasis on capital and income following the crisis. Unsurprisingly, bank liquid assets played an even stronger role in affecting loan growth during the crisis, and that effect has

persisted. Moreover, the relatively weaker effect of secondary liquid assets compared to primary liquid assets became even more prominent during the crisis.

Columns 2 and 3 contain the corresponding results for the changes in C&I and CRE loans, respectively. The estimated coefficients show evidence of a reversion to the mean, or a rebalancing, in the loan shares, in the sense that banks with a higher share of C&I loans tend to grow their C&I loans more slowly, while banks with a higher share of CRE loans tend to grow their CRE loans more slowly. The tables also show that the growth in these loans tends to be positively associated with the volume of unused loan commitments, and tend to be even more sensitive to unused loan commitments of the same type: more unused C&I loan commitments being associated with even faster subsequent growth in C&I loans, and more unused CRE loan commitments being associated with even faster subsequent growth in CRE loans. While larger bank size and a higher nonperforming loan ratio restrain changes in both C&I and CRE loans, only C&I loans are affected by ROA, core deposits, and state employment growth. While stronger ROA and state employment growth encourages C&I loan growth, the core deposit ratio is inversely related to the change in C&I loans.

With respect to the crisis and post-crisis differential effects, the equations include only those pairs of interaction terms for which at least one of the interaction terms is statistically significant for that loan type (C&I or CRE). For both C&I loans and CRE loans, ROA became less important during the crisis, but more important after the crisis, compared with the pre-crisis period, while liquidity became more important during the crisis and even more important after the crisis. Secondary liquid assets tended to be relatively less important during the crisis for each loan category, consistent with the results for the change in total loans. For the change in C&I loans, total loan commitments had a smaller positive effect during the crisis. Moreover, the

differential effect for C&I loan commitments became stronger during the crisis, but then became weaker after the crisis, compared to the pre-crisis period. For the change in CRE loans, during the crisis the capital ratio had an even stronger positive effect and nonperforming loans had an even stronger negative effect, with the latter effect persisting after the crisis. In addition, during the crisis, CRE loan commitments had a weaker differential effect, while employment growth had a stronger positive effect after the crisis.

Table 3 contains the results for three measures of the change in small ($1 million or less loan size) C&I loan shares. By comparing the results across the three columns in Table 3, one can get a relative sense of the extent to which small business lending is, or is not, being crowded out by other assets on a bank's balance sheet. The three columns show the results for the changes in the small C&I loan share of assets, total loans, and total C&I loans, respectively, and include only those pairs of crisis and post-crisis interaction terms for which at least one estimated coefficient is statistically significant. The evidence in the first row shows that the larger the bank, the greater is the decline (or the smaller the rise) in the share of small C&I loans relative to assets, with the response being even larger (in absolute value) for the share of total loans. Interestingly, no such relationship is observed for small C&I loans as a share of total C&I loans. Following the crisis, these negative relationships are less pronounced. Similarly, the larger the share of C&I loans in a bank's portfolio, the smaller is any increase in the small C&I loan share relative to assets, with an even larger impact for the share of small C&I loans relative to total loans. However, for the share of small C&I loans within total C&I loans, the effect is positive, suggesting that banks that do focus on C&I loans tend to increase (decrease) small C&I loans more (less) than large C&I loans. Thus, the rebalancing of bank portfolios suggested in the Table 2 results may be occurring primarily at the expense of large rather than small C&I loans. On the

other hand, banks that hold relatively more real estate and CRE loans tend to decrease the shares of small C&I loans (or increase the share more slowly) with respect to both assets and total loans, with no significant effects on the mix of small C&I loans relative to large C&I loans.

The capital ratio has a significant negative effect only on the change in the share of small C&I loans relative to assets, with that effect being reduced by about half during the post-crisis period. Moreover, during the post-crisis period, the capital ratio has a large negative effect on the change in the share of small C&I loans relative to total C&I loans, suggesting an increased emphasis on large relative to small C&I loans among the better capitalized banks following the crisis. Nonperforming loans have a depressing effect on the change in the share of small C&I loans, although the net effect is positive during the crisis for the change in the share of small C&I loans relative to total C&I loans. While ROA has no significant effects prior to the crisis, during the crisis, higher ROA is associated with a smaller change in small C&I loans as a share of both assets and total loans, but not as a share of total C&I loans. Core deposits have a depressing effect on the change in the small C&I loan share relative to both assets and total loans, but not relative to total C&I loans. Interestingly, liquid assets have a positive effect on the change in small C&I loans relative to assets, but a negative effect when measured relative to total C&I loans, and during the post-crisis period, a relatively larger positive effect on the share relative to both total assets and total loans. Secondary liquid assets have a weaker positive effect on the change in the small C&I loan share relative to total assets. The negative effect of total loan commitments on the small C&I loan share increases as the shares are measured relative to assets, then total loans, and finally total C&I loans, although only that for the share of total loans is significant. This latter effect is mitigated somewhat during the crisis, while the negative effect becomes more pronounced after the crisis for the share relative to total assets. The differential

effect for CRE loan commitments is negative for the change in the small C&I loan share relative to total loans, while the differential effect for C&I loan commitments is positive for the change in the shares relative to both total assets and total loans.

Table 4 contains the results for the change in the shares of small ($1 million or less loan size) CRE loans. The three columns in Table 4 show the results for the changes in the small CRE loan shares of assets, total loans, and total CRE loans, respectively, and include only those pairs of crisis and post-crisis interaction terms for which at least one estimated coefficient is statistically significant. In contrast to the results for small C&I loan shares, bank size has a positive impact on the shares of small CRE loans, with those for the shares relative to assets and relative to total CRE loans being statistically significant. Moreover, the positive effect is even larger during the crisis period for the share relative to total assets, and during the post-crisis period for the shares relative to both total assets and total loans. The shares of C&I loans and total real estate loans have positive effects on the change in the shares of small CRE loans relative to both assets and total loans. Consistent with the effect of the share of C&I loans on the change in small C&I loans, the share of CRE loans has a negative effect on the change in the shares of small CRE loans relative to both assets and total loans, but a positive effect on the change in the share of small CRE loans relative to total CRE loans. Thus, again, while rebalancing may be going on within a bank's portfolio in terms of total CRE loans, it appears to be occurring primarily at the expense of large rather than small CRE loans.

The capital ratio has a negative effect on the share of small CRE loans relative to assets during the pre-crisis period, although the effect during the crisis is only about half as large. Higher nonperforming loans appear to cause small CRE loans to be crowded out by non-loan assets (column 1), but to result in a larger change in the small CRE loan share relative to total

loans. ROA has a negative effect on the small CRE loan shares relative to both assets and total loans, with the effect being larger (in absolute value) for the share relative to assets during the crisis period and for both shares during the post-crisis period. While core deposits have no significant effects during the pre-crisis or crisis periods, core deposits do have a negative effect during the post-crisis period for the share of small CRE loans relative to total assets.

The effects of liquid assets on small CRE loans relative to assets and relative to total CRE loans are of opposite signs, as was the case for C&I loans in Table 3, positive for the share relative to assets and negative for the share relative to total CRE loans. Thus, it appears that banks with more liquid assets tend to have larger changes in total CRE loans, but do so primarily with large rather than small CRE loans. That is, an increase in liquid assets is associated with a bias favoring larger relative to smaller CRE loans. Moreover, the positive liquid assets effect is larger during the crisis period for the change in the share of small CRE loans relative to assets. Note that for the change in the share of small CRE loans relative to assets, secondary liquid assets have a smaller net effect than primary liquid assets. Employment growth has a significant effect for all three loan shares, being negative for the change in small CRE loans relative to both total assets and total loans, and positive for the change in small CRE loans relative to total CRE loans. Thus, while small CRE loans are being crowded out by non-loans and by non-CRE loans, they are not being crowded out by large CRE loans, but instead are gaining relative to large CRE loans as the local economy strengthens.

Table 5 mimics Table 3 for the smallest category of C&I loans, those loans equal to or less than $100,000. Again, the table contains only those pairs of crisis and post-crisis interactive terms for which at least one of the estimated coefficients is statistically significant. The results are generally similar to those in Table 3, although some notable differences are apparent. For

example, in Table 3 the share of CRE loans had significant negative estimated coefficients for the change in the share of small C&I loans relative to both total assets and total loans, yet for the smallest category of C&I loans, both effects are positive, with that for the change in the share relative to assets being statistically significant. In addition, a higher capital ratio is associated with a reduction in the change in the smallest C&I loans relative to total C&I loans, suggesting that better capitalized banks tend to shift their mix of C&I loans away from loans of $100,000 or less, even though Table 3 showed no evidence of a movement away from loans of $1 million or less. Similarly, during the crisis, and continuing after the crisis, a higher nonperforming loan ratio is associated with a much smaller reduction in the change in loans of $100,000 or less as a share of total assets that is not apparent for loans of $1 million or less. Finally, for loans of $100,000 or less, the change in small C&I loans as a share of total C&I loans is positively associated with total loan commitments and negatively associated with the differential effects emanating from both CRE and C&I loan commitments. Given the relative sizes of the estimated coefficients, the evidence suggests that more C&I loan commitments are associated with a shift in the mix of C&I loans away from the smallest category of C&I loans, while more CRE loan commitments also appear to be met at the expense of the smallest C&I loans.

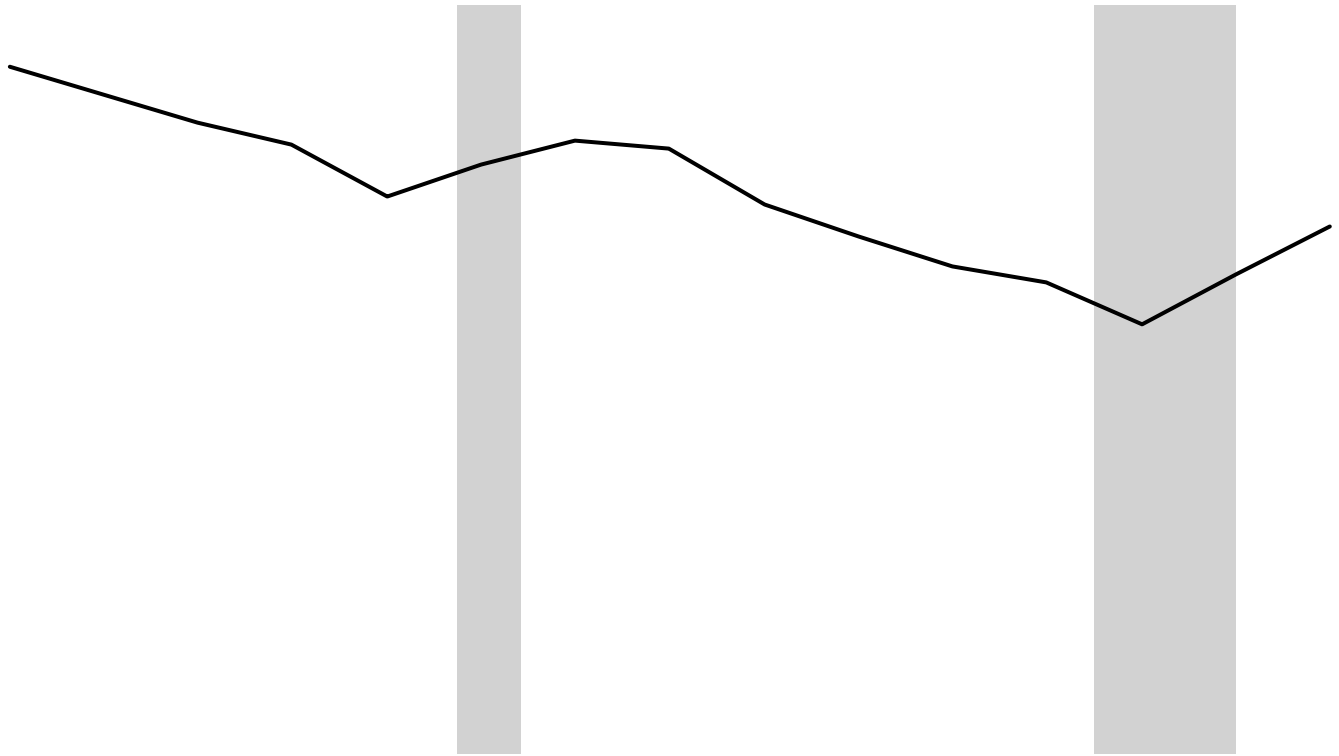
Table 6 mimics Table 4 for the smallest category of CRE loans, those loans equal to or less than $100,000. Again, the table contains only those pairs of crisis and post-crisis interactive terms for which at least one of the estimated coefficients is statistically significant. The results are generally similar to those in Table 4, although some notable differences are apparent. For example, the effect of the real estate loan share switches signs in the first two columns, much like the case with the CRE loan share for the smallest C&I loans in Table 5. Thus, banks with a higher share of real estate loans tend to have a smaller change in the small ($1 million or less)

CRE loan shares of both total assets and total loans, but a larger change in the $100,000 or less CRE loan shares of both total assets and total loans. In addition, while a higher capital ratio, a higher nonperforming loan ratio, and a higher ROA discourage increases in the small ($1 million or less) CRE share of assets, those effects are no longer significant when the focus is on CRE loans of $100,000 or less. In fact, the effect also disappears for the change in the share of small CRE loans relative to total loans, and for the smallest category of CRE loans, ROA has a positive effect on the change relative to total CRE loans during the crisis period. Finally, total loan commitments encouraged larger changes in the smallest CRE loan category relative to both total assets and total loans during the crisis period.

Economic Significance

While evidence of statistical significance of bank liquidity concerns has been presented, a natural question is to what degree the effects are of economic significance. The economic effects come from a combination of the estimated effect of an explanatory variable and the movement of the variable. Figure 4 shows the movements in the two measures of bank liquid assets and the measure of total unused loan commitments, in each case aggregated over the sample of commercial banks used in the analysis. Because these measures are ratios, to avoid distortions, the aggregate ratios were calculated by summing the numerator values and denominator values across all banks and then dividing, rather than averaging individual bank ratios. Recall that both Liquid1 and Liquid2 are measures of liquid assets scaled by total assets, while Commitl is total unused loan commitments scaled by total loans.

Figure 4: Liquid Assets and Unused Loan Commitments



Because Liquid2 represents the component of total liquid assets, Liquid1, that is deemed to be composed of those liquid securities that are somewhat less liquid than U.S. treasury and GSE securities, the vertical distance between the Liquid1 and Liquid2 lines represents the remaining component of Liquid1 that is considered to be composed of the most liquid assets. The figure shows a general downward trend in total liquid assets as a share of total assets until recently. The two notable exceptions are the rise that began prior to the 2001 recession and the rise that began in the most recent recession. On the other hand, the Liquid2 component is relatively flat except for a temporary rise prior to the 2001 recession that peaks at about the same time that Liquid1 troughs, and then declines into the beginning of the recession, and the decline going into the most recent recession. This suggests that banks had been shifting the composition of their liquid assets into (at least what turned out to be) relatively less liquid securities over time until they faced the dire consequences of doing so during the financial crisis, after which the composition of Liquid1 moved sharply back toward the most liquid of liquid assets. With respect to the provision of liquidity on demand, no trend is apparent in the unused loan commitments ratio, although Commitl does exhibit fluctuations. The series rose and then fell prior to the 2001 recession, and then climbed back up before starting a persistent decline prior to the most recent recession that has continued during the immediate post-crisis period.

To obtain a sense of the economic significance of the liquid assets and unused loan commitment effects on the small ($1 million of less) loan shares, the estimated coefficients can be multiplied by a shock to the explanatory variables. The shock considered here is a change from the 25^{th} percentile to the 75^{th} percentile in the value of the explanatory variable. For a shock to the most liquid component of Liquid1 (that is, with no change in Liquid2), the resulting changes in the percentage shares of small C&I loans relative to total assets, total loans, and total

C&I loans for the pre-crisis period are 0.83, 0.02 and -1.00, respectively. That is, the shock increases the ratio of small C&I loans to assets by almost a full percentage point, while reducing the ratio of small C&I loans to total C&I loans by a full percentage point. To put these changes in perspective, the median values for these two ratios are 7.10 and 65.51, respectively, so that the effect on the ratio of small C&I loans to total assets is much more meaningful than for the ratio of small C&I loans to total C&I loans. During the crisis period, the increase is slightly larger for the change in the ratio of small C&I loans to assets (0.84), with a much larger reduction in the ratio of small C&I loans to total C&I loans (-1.58). During the immediate post-crisis period, the corresponding changes in the ratios are 0.94 and 0.19, respectively.

When the same experiment is done for a shock to unused loan commitments, the effects tend to be smaller than for liquid asset shocks. For example, the effects on the three ratios of a shock to C&I loan commitments are only 0.19, 0.09 and -0.30, respectively, during the pre-crisis period, although they are larger (in absolute value) during the crisis period (0.23, 0.20, and -0.40), and, for the ratio of small C&I loans to total C&I loans during the immediate post-crisis period, much larger (-1.38).

For small CRE loans, the same experiments for a shock to Liquid1 result in changes of 0.75, -0.07 and -1.31 for the ratios of small CRE loans to total assets, total loans, and total CRE loans, respectively, during the pre-crisis period. For the crisis and post-crisis periods, the effects on the ratio of small CRE loans to assets rise slightly, while the effects on the ratio of small CRE loans to total CRE loans rise (in absolute value) by a more meaningful amount of -1.92 and -1.81, respectively. The unused CRE loan commitment effects on the ratio of small CRE loans to total assets and to total CRE loans are smaller than the liquid asset effect, being 0.14 and -0.85,

respectively, with no significant difference for the crisis and post-crisis periods relative to the pre-crisis period.

Conclusions

This study investigates the role of bank liquidity in determining bank lending behavior. As providers of liquidity on demand, banks must both hold liquid assets and control their exposures to liquidity shocks, whether those shocks are liquidity funding shocks to the liability side of their balance sheet or loan demand shocks associated with their exposure derived from unused loan commitments and lines of credit. However, such liquidity pressures are not independent and tend to feedback on each other.

The importance of liquidity buffers and exposure to liquidity shocks became particularly clear during the recent financial crisis, when banks came under increasing stress as short-term funding dried up for both financial and nonfinancial firms, and firms cut off from direct access to credit markets turned to banks for loans. After an initial surge in C&I loans associated with the takedown of unused loan commitments, bank loans plummeted. While some of the decline in loan demand may be attributable to weakened loan demand associated with the recession, the supply of bank credit also was a major factor.

The panel data analysis finds results for the change in total loans, C&I loans and CRE loans as a share of total assets that are consistent with expectations: a higher capital ratio, a smaller nonperforming loan ratio, a higher return on assets, a higher liquid assets ratio, and higher unused loan commitment ratios are each associated with larger changes in loan shares. In addition, the change in the C&I (CRE) loan share is even more sensitive to unused C&I (CRE) loan commitments than overall loan commitments. Moreover, the evidence indicates a clear rebalancing effect, whereby a higher share of C&I loans in a bank's asset portfolio reduces the

change in C&I loans and a higher share of CRE loans in a bank's asset portfolio reduces the change in CRE loans.

During and after the financial crisis, loan shares tended to be more sensitive to the capital ratio (positive), the nonperforming loan ratio (negative), and the liquid assets ratio (positive). On the other hand, the loan shares tended to be less sensitive to bank ROA during the crisis, but more sensitive to ROA immediately after the crisis. The change in the C&I loan share of assets was relatively more sensitive to C&I loan commitments during the crisis, perhaps due to the rush of takedowns associated with distress borrowing by firms, but less sensitive immediately after the crisis. On the other hand, the change in the CRE loan share of assets was relatively less sensitive to CRE loan commitments during the financial crisis.

For the changes in the small loan shares, several interesting patterns emerge. While the general rebalancing effect is apparent for both small C&I and small CRE loans for their shares relative to both total assets and total loans, that rebalancing appears to be primarily at the expense of large, not small, loans. That is, a higher portfolio share of C&I loans is associated with a larger change in small C&I loans as a share of total C&I loans, and a higher portfolio share of CRE loans is associated with a larger change in small CRE loans as a share of total CRE loans. With respect to bank health, a higher capital ratio is associated with a smaller change in both small C&I and small CRE loans as a share of total assets. Similarly, a higher nonperforming loan ratio slows the growth in the share of small C&I loans relative to both total assets and total loans, as does a higher core deposits ratio. This suggests that healthier banks tend to shy away from small C&I loans. The evidence provides similar indications for small CRE loans, with the additional evidence of the change in the small CRE loan ratios being reduced by higher ROAs, although a higher nonperforming loan ratio is associated with a larger change in small CRE loans

relative to total loans, perhaps indicating a relative shift between small C&I loans and small CRE loans.

Liquidity also impacts bank portfolio composition in terms of small business loans relative to total assets and total loans, as well as the mix of small versus large C&I and CRE loans. Banks with more liquid assets tend to have a larger change in both small C&I loans and small CRE loans relative to total assets, yet tend to have a smaller change in the share of small C&I loans relative to total C&I loans and small CRE loans relative to total CRE loans, suggesting that more liquid banks are more willing to increase small C&I loans, and even more willing to increase large C&I loans. While the sensitivity to liquidity did not change during the crisis for small C&I loans, the immediate post-crisis period exhibited increased sensitivity of the share relative to both total assets and total loans. On the other hand, the share of small CRE loans relative to total assets showed increased sensitivity to liquid assets during the crisis but with no lasting differential effect post-crisis.

Unused loan commitments do not appear to play a role in the relative composition of small versus large C&I and CRE loans, although they do impact the change in the share of small C&I loans relative to total assets and total loans. Thus, for example, to the extent that unused C&I loan commitments positively impact the change in small C&I loans relative to total assets and total loans, they do not appear to do so at the expense of large C&I loans.

For the smallest category of C&I loans, those loans equal to or less than $100,000, the results are generally similar to those for loans equal to or less than $1 million, with only a few notable differences. For example, the evidence suggests that better capitalized banks tend to shift their mix of C&I loans away from loans of $100,000 or less, even in the absence of evidence of a movement away from loans of $1 million or less. Similarly, during the crisis, and continuing

after the crisis, a higher nonperforming loan ratio is associated with a much smaller reduction in the change in loans of $100,000 or less as a share of total assets that is not apparent for loans of $1 million or less. Finally, for loans of $100,000 or less, the change in small C&I loans as a share of total C&I loans is positively associated with total loan commitments and negatively associated with the differential effects emanating from both CRE and C&I loan commitments. Given the relative sizes of the estimated coefficients, the evidence suggests that more C&I loan commitments are associated with a shift in the mix of C&I loans away from the smallest category of C&I loans, while more CRE loan commitments also appear to be met at the expense of the smallest C&I loans.

For the smallest category of CRE loans, those loans equal to or less than $100,000, the results are generally similar to those for CRE loans equal to or less than $1 million. Among the differences compared to loans of $1 million or less are that banks with a higher share of real estate loans tend to have a smaller change in the small ($1 million or less) CRE loan shares of both total assets and total loans, but a larger change in the $100,000 or less CRE loan shares of both total assets and total loans. In addition, while a higher capital ratio, a higher nonperforming loan ratio, and a higher ROA discourage increases in the small ($1 million or less) CRE share of assets, those effects are no longer significant when the focus is on CRE loans of $100,000 or less. In fact, the effect also disappears for the change in the share of small CRE loans relative to total loans, and for the smallest category of CRE loans, ROA has a positive effect on the change relative to total CRE loans during the crisis period. Finally, total loan commitments encouraged larger changes in the smallest CRE loan category relative to both total assets and total loans during the crisis period.

In summary, bank holdings of liquid assets did become a more important factor during the financial crisis for bank lending generally, with the increased sensitivity persisting during the immediate post-crisis period. On the other hand, unused loan commitments tended to become less important, other than for a temporary increase for C&I loan commitments on C&I lending during the crisis. For small C&I loans, higher liquid assets tended to encourage such lending, but appear to encourage large C&I lending even more. Moreover, the liquid assets effects tend to be stronger during the post-crisis period as banks' experiences during the financial crisis sensitized them to the difficulties they could face when liquidity dries up. For small CRE loans, much as for small C&I lending, higher liquid assets tended to encourage small CRE lending, but encouraged large CRE lending even more. For the smallest category of both C&I and CRE loans ($100,000 or less), higher liquid assets encouraged such lending relative to total assets, but not relative to total loans, and tended to reduce the changes in both small C&I and CRE loans relative to total C&I and total CRE loans, respectively.

Unfortunately, data availability imposes some limitations on the study. Having more years of data following the financial crisis would allow a more thorough investigation of the extent to which any changes in bank behavior will persist. At this point, we cannot be sure how transient or permanent any changes identified at this early stage will be; only time will tell. Another limitation concerns the availability of securitization data in the Call Reports. While knowledge exists of the extent to which banks had assets in the securitization pipeline when those markets froze, forcing banks to retain those assets and possibly crowding out small business lending, banks have reported details of their securitization pipeline only in very recent years, preventing a comparison with pre-crisis bank behavior. Finally, as with all such studies, the variable of interest is bank lending. However, the Call Reports do not report the flow of

lending. Instead, one must construct a proxy for lending as the change in loans held in a bank's portfolio.

References

Ashcraft, A. (2005). Are banks really special? New evidence from the FDIC-induced failure of healthy banks, *American Economic Review*, 95(5), 1712-1730.

Berger, A.N. and Udell, G.F. (1994). Did risk-based capital allocate bank credit and cause a "credit crunch" in the U.S.?, *Journal of Money, Credit and Banking*, 26, 585-628.

Black, Lamont K. and Rosen, Richard J. (2008). The Effect of Monetary Policy on the Availability of Credit: How the Credit Channel Works, manuscript, February.

Campello, M. (2002). Internal capital markets in financial conglomerates: Evidence from small bank responses to monetary policy, *Journal of Finance*, 57(6)**,** 2773-2805.

Campello, Murillo, Giambona, Erasmo, Graham, John R., and Harvey, Campbell R. (2010). Liquidity management and corporate investment during a financial crisis, SSRN ID No. 1444009, November 19.

Cole, R. A. (1998). The Importance of Relationships to the Availability of Credit, *Journal of Banking and Finance,* 22, 959-977.

Cornett, Marcia M., McNutt, Jamie J., Strahan, Philip E., and Tehranian, Hassan. (2010). Liquidity risk management and credit supply in the financial crisis, manuscript, April.

Hall, B.J. (1993). How has the Basle accord affected bank portfolios?, *Journal of the Japanese and International Economies*, 7(4), 408-440.

Hancock, D. and Wilcox, J.A. (1994). Bank capital and the credit crunch: The roles of risk-weighted and unweighted capital regulation, *Journal of the American Real Estate and Urban Economics Association*, 22, 59-94.

Holod, D. and Peek, J. (2007). Asymmetric information and liquidity constraints: A new test, *Journal of Banking and Finance*, 31(8), 2425-2451.

Huang, Rocco. (2009). How committed are bank lines of credit? Evidence from the subprime mortgage crisis, manuscript, November 19.

Ivashina, Victoria and Scharfstein, David. (2009). Bank lending during the financial crisis of 2008, *Journal of Financial Economics*, 97, 319-38.

Jeon, Jihye, Montoriol-Garriga, Judit, Triest, Robert K., and Wang, J. Christina. (2010). Evidence of a credit crunch? Results from the 2010 survey of first district community banks, FRB Boston Public Policy Briefs, No. 10-3, September.

Kacperczyk, Marcin and Schnabl, Philipp. (2009). When safe proved risky: commercial paper during the financial crisis of 2007-2009, NBER Working paper No. 15538, November.

Kashyap, A.K., Rajan, R., and Stein, J.C. (2002). Banks as Liquidity Providers: An Explanation for the Co-Existence of Lending and Deposit-Taking, *Journal of Finance*, 57(1), 33-74.

Kashyap, A.K. and Stein, J.C. (1995). The impact of monetary policy on bank balance sheets, *Carnegie-Rochester Conference Series on Public Policy*, 42, 151-195.

Kashyap, A.K. and Stein, J.C. (2000). What do a million observations on banks say about the transmission of monetary policy?, *American Economic Review*, 90(3), 407-428 .

Kashyap, A.K. and Stein, J.C. (2004). Cyclical implications of the Basel II capital standard, Federal Reserve Bank of Chicago *Economic Perspectives*, First Quarter, 18-31.

Kishan, R. and Opiela, T. (2000). Bank size, bank capital, and the bank lending channel, *Journal of Money, Credit and Banking*, 32, 121-141.

Mora, Nada. (2010). Can banks provide liquidity in a financial crisis? FRB Kansas City *Economic Review*, 95, 31-67.

Morgan, D.P. (1998). The Credit effect of monetary policy: Evidence using loan commitments, *Journal of Money, Credit and Banking*, 30, 102-118.

Morgan, D. P.)1999). Whether and Why Banks are Opaque, *35th Annual Conference on Bank Structure and Competition Proceedings*, May 1999.

Park, Ki Young. (2007). Macroeconomic implications of bank loan commitments, manuscript, October 2.

Peek, J. and Rosengren, E.S. (1995a). The capital crunch: Neither a borrower nor a leader be, *Journal of Money, Credit and Banking*, 27(3), 625-38.

Peek, J. and Rosengren, E.S. (1995b). Bank regulation and the credit crunch, *Journal of Banking and Finance*, 19(3-4), 679-692.

Strahan, P.E. (forthcoming). Liquidity production in 21st century banking, in Berger, A., Molyneux, P., and Wilson, J. (eds), *The Oxford Handbook of Banking*.

Udell, G. (1997). The Consolidation of the Banking Industry and Small Business Lending, in *Bank Mergers and Acquisitions*, edited by Amihud and Miller, Stern Kluwer Publishers, 221-235.

Tables

Table 1a: Variable Descriptions

Variable	Source	Description
Cla	CR	Change in total loans scaled by total assets
Ccia	CR	Change in C&I loans scaled by total assets
Ccrea	CR	Change in CRE loans scaled by total assets
Csmcia	CR	Change in the share of small C&I loans relative to total assets
Csmcil	CR	Change in the share of small C&I loans relative to total loans
Csmcici	CR	Change in the share of small C&I loans relative to total C&I loans
Csmcrea	CR	Change in the share of small CRE loans relative to total assets
Csmcrel	CR	Change in the share of small CRE loans relative to total loans
Csmcrecre	CR	Change in the share of small CRE loans relative to total CRE loans
Csm1cia	CR	Change in the share of small (<$100,000) C&I loans relative to total assets
Csm1cil	CR	Change in the share of small (<$100,000) C&I loans relative to total loans
Csm1cici	CR	Change in the share of small (<$100,000) C&I loans relative to total C&I loans
Csm1crea	CR	Change in the share of small (<$100,000) CRE loans relative to total assets
Csm1crel	CR	Change in the share of small (<$100,000) CRE loans relative to total loans
Csm1crecre	CR	Change in the share of small (<$100,000) CRE loans relative to total CRE loans
Lasset	CR	Log of real assets, using GDP price deflator to convert nominal to real values
Shci	CR	Share of C&I loans relative to total assets
Shre	CR	Share of total real estate loans relative to total assets
Shcre	CR	Share of CRE loans relative to total assets
Kalev	CR	Tier 1 capital ratio
Npltl	CR	Nonperforming loans scaled by total loans
Roa	CR	Return on assets
Core	CR	Core deposits scaled by total assets
Liquid1	CR	Liquid assets scaled by total assets
Liquid2	CR	Relatively less liquid components of Liquid1 scaled by total assets
Commitl	CR	Total unused loan commitments scaled by total loans
Commitcre	CR	Unused CRE loan commitments scaled by total loans
Commitci	CR	Unused C&I loan commitments scaled by total loans
Gempl	BLS	State employment growth for state in which bank is headquartered

Note: CR indicates Federal Reserve's Consolidated Reports of Condition and Income (Call Reports); BLS indicates the U.S. Bureau of Labor Statistics

Table 1b: Summary Statistics

Variable	N	Mean	Median	Min	Max	SD
Cla	85241	4.952	3.991	-40.034	54.953	7.776
Ccia	85241	0.732	0.404	-14.320	16.001	2.585
Ccrea	85241	1.490	0.760	-15.780	19.263	3.112
Csmcia	85241	-0.124	-0.119	-11.261	10.899	2.121
Csmcil	85241	-0.264	-0.237	-16.811	15.980	3.151
Csmcici	7591	-1.744	-1.453	-51.797	48.788	11.347
Csmcrea	85241	0.127	0.000	-12.307	12.585	2.389
Csmcrel	85241	0.147	0.000	-17.787	18.214	3.493
Csmcrecre	9214	-2.535	-2.152	-44.520	39.511	8.764
Csm1cia	85048	-0.168	-0.126	-10.597	10.075	1.681
Csm1cil	85048	-0.319	-0.217	-16.959	16.021	2.689
Csm1cici	23368	-1.408	-1.038	-38.425	35.680	7.907
Csm1crea	85048	-0.053	-0.043	-9.879	9.638	1.447
Csm1crel	85048	-0.110	-0.074	-15.696	15.275	2.371
Csm1crecre	22118	-0.783	-0.391	-21.545	19.704	3.536
Lasset	85241	11.475	11.406	7.771	18.419	1.081
Shci	85241	0.153	0.136	0.000	0.567	0.091
Shre	85241	0.608	0.628	0.000	1.000	0.185
Shcre	85241	0.184	0.160	0.000	0.741	0.132
Kalev	85241	0.101	0.093	0.029	0.241	0.029
Npltl	85241	0.011	0.007	0.000	0.079	0.013
Roa	85241	0.012	0.012	-0.024	0.046	0.006
Core	85241	0.721	0.732	0.323	0.950	0.091
Liquid1	85241	0.328	0.311	-0.301	0.921	0.153
Liquid2	85241	0.162	0.142	0.000	0.635	0.115
Commitl	85241	0.149	0.131	0.000	0.720	0.100
Commitcre	85241	0.032	0.016	0.000	0.241	0.042
Commitci	85241	0.095	0.077	0.000	0.547	0.078
Gempl	85241	0.009	0.014	-0.068	0.073	0.020

Table 2: The Change in Total, C&I, and CRE Loans

	Cla	Ccia	Ccrea
Lasset	-4.310**	-1.182**	-0.491**
	(0.265)	(0.079)	(0.094)
D789XLasset	0.063	-0.016	-0.026
	(0.096)	(0.031)	(0.034)
D10XLasset	-0.628**	-0.105*	-0.100*
	(0.128)	(0.045)	(0.047)
Shci	7.812**	-8.743**	4.735**
	(1.024)	(0.432)	(0.392)
Shre	2.647**	0.273	2.938**
	(0.857)	(0.281)	(0.295)
Shcre	4.581**	-0.787**	-9.023**
	(0.784)	(0.280)	(0.367)
Kalev	8.187*	0.421	2.253
	(3.226)	(0.984)	(1.174)
D789XKalev	5.799		3.150**
	(3.005)		(1.167)
D10XKalev	10.097*		0.117
	(4.835)		(1.787)
Npltl	-104.068**	-19.503**	-16.002**
	(3.859)	(1.128)	(1.376)
D789XNpltl	-11.761		-10.145**
	(6.842)		(2.708)
D10XNpltl	-4.970		-11.490**
	(7.886)		(3.211)
ROA	63.901**	16.513**	0.560
	(11.259)	(3.668)	(3.895)
D789XROA	-17.016	-10.024*	-14.599*
	(15.586)	(4.795)	(6.178)
D10XROA	67.984**	13.109*	14.963*
	(20.192)	(5.637)	(7.072)
Core	0.281	-0.622*	0.331
	(0.912)	(0.285)	(0.334)
D789XCore	-0.352		
	(1.045)		
D10XCore	0.669		
	(1.363)		
Liquid1	6.883**	1.380**	0.625**
	(0.678)	(0.213)	(0.233)
D789XLiquid1	6.243**	1.181**	1.500**

	(0.732)	(0.227)	(0.285)
D10XLiquid1	7.861**	1.677**	2.081**
	(0.962)	(0.325)	(0.353)
Liquid2	-1.174*	-0.183	-0.357
	(0.574)	(0.192)	(0.208)
D789XLiquid2	-2.916**	-0.659*	-0.706*
	(0.839)	(0.283)	(0.336)
D10XLiquid2	2.058	0.517	0.578
	(1.194)	(0.401)	(0.443)
Commitl	16.017**	2.429**	4.761**
	(2.542)	(0.771)	(0.924)
D789XCommitl	-2.767	-1.167*	
	(2.433)	(0.550)	
D10XCommitl	-3.997	-1.619	
	(3.065)	(1.000)	
Commitcre	22.223**	0.140	5.283**
	(3.006)	(0.931)	(1.157)
D789XCommitcre	-5.673		-4.097**
	(3.385)		(0.960)
D10XCommitcre	-4.975		1.665
	(5.610)		(2.134)
Commitci	1.036	2.023*	-1.802
	(2.717)	(0.839)	(0.975)
D789XCommitci	4.172	1.236*	
	(2.624)	(0.615)	
D10XCommitci	3.485	-2.138*	
	(3.349)	(1.066)	
Gempl	23.696**	5.188**	-0.809
	(4.311)	(1.198)	(1.794)
D789XGempl	9.980		4.690
	(7.047)		(2.955)
D10XGempl	3.914		8.830**
	(8.011)		(3.322)
Adj. R-sq	0.343	0.159	0.264
Observations	85241	85241	85241

Notes: Each equation also includes time and bank fixed effects, as well as allowing for within-cluster error correlation at the bank level. Cluster-robust standard errors are in parentheses. ** and * indicate significance at the 1 percent and 5 percent levels, respectively.
Sources: Federal Reserve's Consolidated Reports of Condition and Income and National Information Center database

Table 3: The Change in Small ($1 million or less) C&I Loan Shares

	Csmcia	Csmcil	Csmcici
Lasset	-0.151**	-0.414**	0.729
	(0.049)	(0.076)	(0.770)
D789XLasset	0.030	-0.052	-0.118
	(0.021)	(0.031)	(0.331)
D10XLasset	0.139**	0.132**	0.087
	(0.032)	(0.047)	(0.522)
Shci	-11.059**	-20.246**	16.723**
	(0.315)	(0.491)	(4.444)
Shre	-0.072	-0.806*	-1.664
	(0.205)	(0.321)	(3.742)
Shcre	-0.786**	-1.695**	-1.781
	(0.209)	(0.316)	(3.398)
Kalev	-4.193**	-1.827	7.359
	(0.757)	(1.148)	(16.034)
D789XKalev	0.704	0.191	-31.030
	(0.761)	(1.161)	(20.721)
D10XKalev	2.387*	2.660	-95.723**
	(1.160)	(1.827)	(33.516)
Npltl	-8.500**	-3.562*	-41.795
	(1.097)	(1.679)	(27.566)
D789XNpltl	0.886	1.107	75.711*
	(1.803)	(2.628)	(37.137)
D10XNpltl	2.335	1.276	46.480
	(2.097)	(3.232)	(42.924)
ROA	2.465	5.001	-76.409
	(2.838)	(4.186)	(48.648)
D789XROA	-12.255**	-10.843*	100.689
	(3.725)	(5.333)	(71.729)
D10XROA	-1.051	-4.946	61.614
	(4.528)	(6.791)	(91.648)
Core	-0.852**	-0.637*	1.381
	(0.208)	(0.306)	(2.678)
Liquid1	4.017**	0.082	-5.924*
	(0.162)	(0.246)	(2.881)
D789XLiquid1	0.059	-0.120	-3.405
	(0.142)	(0.225)	(3.055)
D10XLiquid1	0.509*	0.880*	7.068
	(0.207)	(0.345)	(5.481)

Liquid2	-0.304*	-0.140	-1.546
	(0.142)	(0.241)	(3.600)
Commitl	-0.673	-2.360**	-5.303
	(0.543)	(0.836)	(4.354)
D789XCommitl	0.304	0.816*	-0.654
	(0.238)	(0.351)	(2.988)
D10XCommitl	-1.325**	-0.909	-6.990
	(0.380)	(0.605)	(4.999)
Commitcre	-0.162	-2.222*	10.479
	(0.668)	(1.006)	(6.702)
Commitci	2.201**	3.112**	3.326
	(0.589)	(0.912)	(5.396)
Gempl	0.755	2.527	-0.323
	(1.012)	(1.496)	(17.049)
Adj. R-sq	0.072	0.070	-0.047
Observations	85241	85241	7591

Notes: Each equation also includes time and bank fixed effects, as well as allowing for within-cluster error correlation at the bank level. Cluster-robust standard errors are in parentheses. ** and * indicate significance at the 1 percent and 5 percent levels, respectively.
Sources: Federal Reserve's Consolidated Reports of Condition and Income and National Information Center database

Table 4: The Change in Small ($1 million or less) CRE Loan Shares

	Csmcrea	Csmcrel	Csmcrecre
Lasset	0.128*	0.054	1.477**
	(0.054)	(0.077)	(0.540)
D789XLasset	0.068**	0.039	-0.094
	(0.022)	(0.031)	(0.231)
D10XLasset	0.116**	0.185**	-0.111
	(0.034)	(0.050)	(0.347)
Shci	2.230**	2.212**	1.258
	(0.274)	(0.413)	(3.663)
Shre	1.172**	1.372**	-2.748
	(0.202)	(0.301)	(3.089)
Shcre	-9.628**	-16.662**	17.926**
	(0.270)	(0.383)	(2.165)
Kalev	-4.026**	0.437	6.979
	(0.800)	(1.203)	(11.048)
D789XKalev	2.323**	1.664	-12.180
	(0.873)	(1.306)	(13.883)
D10XKalev	0.959	-0.684	-0.074
	(1.398)	(2.209)	(20.105)
Npltl	-4.023**	3.462*	13.064
	(0.995)	(1.486)	(14.182)
ROA	-11.334**	-16.681**	-29.917
	(2.935)	(4.213)	(32.721)
D789XROA	-11.493**	-9.276	-2.959
	(4.134)	(5.880)	(40.264)
D10XROA	-14.034**	-23.332**	4.001
	(4.939)	(7.262)	(43.830)
Core	-0.134	0.264	0.040
	(0.251)	(0.362)	(2.157)
D789XCore	-0.404	-0.326	-2.716
	(0.306)	(0.433)	(2.683)
D10XCore	-1.264**	-1.361	-0.482
	(0.458)	(0.703)	(4.173)
Liquid1	3.624**	-0.317	-7.619**
	(0.173)	(0.250)	(1.980)
D789XLiquid1	0.369*	-0.318	-3.610
	(0.165)	(0.263)	(2.307)
D10XLiquid1	0.434	0.003	-2.948
	(0.257)	(0.426)	(3.203)

Liquid2	-0.493**	-0.120	-0.660
	(0.156)	(0.251)	(2.674)
Commitl	0.640	-0.726	-5.894
	(0.642)	(0.941)	(3.775)
Commitcre	0.504	-1.703	0.132
	(0.779)	(1.142)	(4.805)
Commitci	-0.629	-0.689	1.589
	(0.680)	(1.011)	(4.915)
Gempl	-3.202**	-5.826**	27.121*
	(1.197)	(1.803)	(11.285)
Adj. R-sq	0.047	0.049	-0.029
Observations	85241	85241	9214

Notes: Each equation also includes time and bank fixed effects, as well as allowing for within-cluster error correlation at the bank level. Cluster-robust standard errors are in parentheses. ** and * indicate significance at the 1 percent and 5 percent levels, respectively.
Sources: Federal Reserve's Consolidated Reports of Condition and Income and National Information Center database

Table 5: The Change in Small ($100,000 or less) C&I Loan Shares

	Csm1cia	Csm1cil	Csm1cici
Lasset	0.059	-0.016	1.089**
	(0.032)	(0.049)	(0.268)
D789XLasset	0.051**	0.020	-0.228
	(0.014)	(0.022)	(0.124)
D10XLasset	0.024	-0.040	-0.128
	(0.022)	(0.037)	(0.205)
Shci	-5.621**	-10.144**	25.315**
	(0.203)	(0.336)	(1.988)
Shre	-0.636**	-1.306**	0.750
	(0.142)	(0.235)	(1.532)
Shcre	0.302*	0.340	-1.248
	(0.130)	(0.204)	(1.151)
Kalev	-1.321**	-0.301	-17.259**
	(0.504)	(0.837)	(5.005)
Npltl	-5.909**	-3.399*	-2.588
	(0.901)	(1.461)	(8.674)
D789XNpltl	3.266*	3.419	17.384
	(1.341)	(2.115)	(12.349)
D10XNpltl	4.139**	3.509	16.784
	(1.553)	(2.584)	(14.692)
ROA	1.321	5.179	-4.349
	(2.007)	(3.116)	(18.013)
D789XROA	-7.469**	-8.112*	8.050
	(2.503)	(3.659)	(21.770)
D10XROA	-3.616	-5.652	32.364
	(3.068)	(5.079)	(28.565)
Core	-0.510**	-0.192	0.134
	(0.139)	(0.217)	(1.061)
Liquid1	1.788**	-0.915**	-3.243**
	(0.108)	(0.180)	(1.012)
Liquid2	-0.089	-0.109	-1.305
	(0.107)	(0.200)	(1.324)
Commitl	0.074	0.121	5.516*
	(0.356)	(0.567)	(2.557)
Commitcre	-0.445	-2.075**	-7.384*
	(0.427)	(0.675)	(3.054)
Commitci	0.148	-0.482	-14.010**
	(0.399)	(0.645)	(3.039)

Gempl	-0.284	0.974	-3.121
	(0.738)	(1.193)	(7.172)
Adj. R-sq	-0.007	-0.011	-0.036
Observations	85048	85048	23368

Notes: Each equation also includes time and bank fixed effects, as well as allowing for within-cluster error correlation at the bank level. Cluster-robust standard errors are in parentheses. ** and * indicate significance at the 1 percent and 5 percent levels, respectively.
Sources: Federal Reserve's Consolidated Reports of Condition and Income and National Information Center database

Table 6: The Change in Small ($100,000 or less) CRE Loan Shares

	Csm1crea	Csm1crel	Csm1crecre
Lasset	0.120**	0.147**	0.124
	(0.025)	(0.040)	(0.113)
D789XLasset	0.039**	0.027	-0.084
	(0.012)	(0.019)	(0.064)
D10XLasset	0.058**	0.056	0.030
	(0.019)	(0.033)	(0.090)
Shci	0.587**	0.768**	-0.398
	(0.134)	(0.223)	(0.835)
Shre	-0.364**	-0.806**	-0.079
	(0.111)	(0.183)	(0.721)
Shcre	-1.982**	-3.427**	5.297**
	(0.121)	(0.196)	(0.517)
Kalev	-0.540	0.761	-0.681
	(0.414)	(0.720)	(2.341)
D789XKalev	0.883*	0.563	-3.281
	(0.430)	(0.741)	(3.014)
D10XKalev	0.418	-0.377	-0.845
	(0.788)	(1.483)	(4.641)
Npltl	0.321	4.189**	-3.138
	(0.674)	(1.159)	(4.418)
D789XNpltl	-2.505*	-4.435**	11.412
	(1.067)	(1.700)	(6.184)
D10XNpltl	0.372	-0.906	5.789
	(1.323)	(2.228)	(7.279)
ROA	-1.292	0.250	-6.011
	(1.600)	(2.664)	(8.135)
D789XROA	-7.704**	-8.569**	18.444*
	(1.953)	(3.073)	(8.989)
D10XROA	-6.075*	-9.009*	4.976
	(2.522)	(4.374)	(11.456)
Core	-0.319**	-0.120	-0.275
	(0.114)	(0.183)	(0.441)
Liquid1	0.790**	-0.777**	-2.599**
	(0.088)	(0.148)	(0.443)
Liquid2	-0.015	-0.039	0.942
	(0.091)	(0.175)	(0.627)
Commitl	-0.044	-0.166	0.124
	(0.293)	(0.475)	(1.237)

D789XCommitl	0.351**	0.467*	-0.014
	(0.126)	(0.203)	(0.539)
D10XCommitl	-0.079	-0.173	-0.124
	(0.214)	(0.370)	(0.917)
Commitcre	0.502	0.295	-0.197
	(0.346)	(0.562)	(1.378)
Commitci	-0.182	-0.461	0.136
	(0.315)	(0.515)	(1.484)
Gempl	-1.604*	-2.331*	0.906
	(0.634)	(1.041)	(2.770)
Adj. R-sq	-0.033	-0.037	-0.020
Observations	85048	85048	22118

Notes: Each equation also includes time and bank fixed effects, as well as allowing for within-cluster error correlation at the bank level. Cluster-robust standard errors are in parentheses. ** and * indicate significance at the 1 percent and 5 percent levels, respectively.
Sources: Federal Reserve's Consolidated Reports of Condition and Income and National Information Center database